Foreword...

LOCAL PUBLIC SAFETY AGENCIES OPERATE A DIVERSE SET OF COMMUNICATIONS INFRASTRUCTURES

- The Public Safety Wireless Network (PSWN) Program Management Office (PMO) commissioned Booz·Allen & Hamilton to independently assess the data collected during the *Land Mobile Radio (LMR) Replacement Cost Study*
  - This report is not intended to represent trends for all local and state public safety communities, however, it is intended to reflect trends in the responses of those who completed the cost survey
  - We invite comments to verify the quality and comprehensiveness of our analysis
  - If you have comments regarding the information contained in this document, please contact the PSWN PMO at 1-800-565-PSWN or access the PSWN program Web site at: http://www.pswn.gov

- Booz·Allen relied on the responses provided to the *LMR Equipment and Infrastructure Survey* as the source of information for this report
  - This survey was administered primarily to collect the data necessary for estimating the replacement cost of existing public safety radio systems
  - The inventory data collected through this survey are revealing in their own right
  - The data was analyzed and represented graphically using **Microsoft Excel** and **SPSS Inc.**, a statistical analysis software package, to generate the information presented in this report

I. INTRODUCTION

DATA COLLECTED FROM LOCAL AND STATE PUBLIC SAFETY AGENCY RESPONSES TO SURVEYS DEVELOPED FOR THE *LAND MOBILE RADIO (LMR) REPLACEMENT COST STUDY* ARE CHARACTERIZED IN THIS REPORT

- Section II discusses the background for the *Data Characterization Report*
  - Report Evolution
  - Cost Study Overview
  - Statistical Accuracy

- Section III summarizes local public safety agency respondents' general system information
  - Demographics
  - System Type
  - Operating Frequency
  - Shared Systems
  - Additional Types of Communications Supported

- Section IV summarizes local public safety agency respondents' user equipment information
  - Portable Radio Vendors
  - Portable Radio Types
  - Portable Radio Security
  - Mobile Radio Vendors
  - Mobile Radio Types
  - Mobile Radio Security

- Section V summarizes local public safety agency respondents' network equipment information
  - Base Stations
  - Repeaters
  - Antenna Towers
  - Dispatch and Control
  - Automatic Vehicle Locator
  - Computer Aided Dispatch
  - Network Equipment Vendors

THE CHARACTERIZATION OF THESE DATA PROVIDES A REVEALING SNAPSHOT OF THE CURRENT INVENTORY OF LOCAL AND STATE PUBLIC SAFETY LMR EQUIPMENT AND INFRASTRUCTURE

- Section VI summarizes state public safety agency respondents' general system information
  - Demographics
  - System Type
  - Operating Frequency
  - Shared Systems
  - Additional Types of Communications Supported

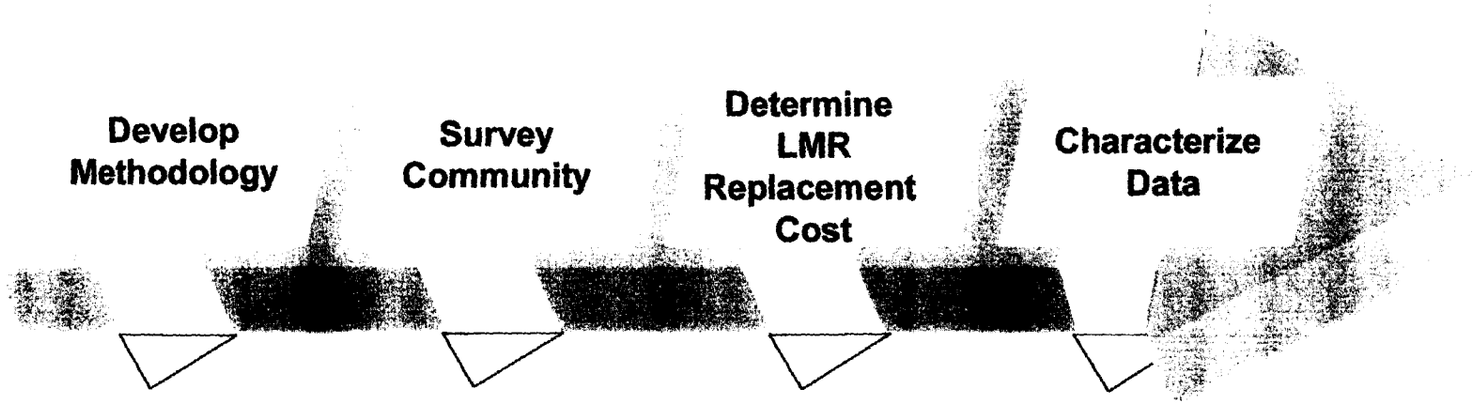
- Section VII summarizes state public safety agency respondents' user equipment information
  - Portable Radio Vendors
  - Portable Radio Types
  - Portable Radio Security
  - Mobile Radio Vendors
  - Mobile Radio Types
  - Mobile Radio Security

- Section VIII summarizes state public safety agency respondents' network equipment information
  - Base Stations
  - Repeaters
  - Antenna Towers
  - Dispatch and Control
  - Automatic Vehicle Locator
  - Computer Aided Dispatch
  - Network Equipment Vendors

- The appendixes of this report provide additional background on the following areas:
  - Appendix A: Local agencies' general systems information
  - Appendix B: Local agencies' user equipment information
  - Appendix C: Local agencies' network equipment information
  - Appendix D: State agencies' general systems information
  - Appendix E: State agencies' user equipment information
  - Appendix F: State agencies' network equipment information

II. REPORT BACKGROUND

THE PSWN PROGRAM'S COST STUDY ACTIVITY CULMINATES WITH A CHARACTERIZATION OF THE DATA COLLECTED DURING A NATIONWIDE ASSESSMENT OF PUBLIC SAFETY COMMUNICATIONS INFRASTRUCTURE



- Devise data collection strategy
- Create Cost Study Methodology Report

- Develop Survey Tool
- Distribute *LMR Equipment and Infrastructure Survey*
- Collect Data

- Create *LMR Replacement Cost Study*

- Analyze Collected Data
- Develop observations from survey responses
- Create *Cost Study Data Characterization Report*

THE DATA USED IN THIS REPORT WERE COLLECTED DURING THE PREPARATION OF THE *LMR REPLACEMENT COST STUDY*[1]

- The methodology employed to determine the replacement cost of public safety's LMR infrastructure is detailed in the *Cost Study Methodology Report*
  - The report defines the sample needed for statistical accuracy and the method by which the study team would achieve this representative sample

- The *Cost Study* used a survey designed to gather information from public safety agencies at all levels of government regarding the type of system on which the agency operates and the type and amount of user equipment each agency possesses
  - A total of 51,385 local public safety agencies were identified for inclusion in the *Cost Study* using the *1997 National Directory of Fire Chiefs* and the *1997 National Directory of Law Enforcement Administrators*
  - The local survey used a stratified random sample that required 4,453 surveys to be distributed and approximately 445 surveys to be returned for an accurate nationwide assessment
  - Several state public safety agencies were identified using sources such as the World Wide Web
  - The cost study team distributed over 150 surveys to these state agencies, and sought a 50% response rate to achieve an accurate sample and an appropriate confidence interval

- The *LMR Replacement Cost Study* reported the total replacement value for all public safety communications systems to be **$18.3 billion**
  - The study estimates the replacement value for local LMR systems at **$15.4 billion**
  - The study estimates the replacement value for state LMR systems at **$1.7 billion**
- The study estimates the replacement value for federal[2] LMR systems at **$1.2 billion**

[1] The phrase "LMR Replacement Cost Study" and "Cost Study" are used interchangeable within this report

[2] Information was collected to estimate the replacement value of existing federal systems. This information was gathered on an agency-by-agency basis and the means used to gather the information varied by agency. Because of this, the extent and type of equipment inventory information for participating federal agencies varies significantly and does not lend itself to the statistical characterization performed in this report. Therefore, the report addresses only local and state information.

DATA CHARACTERIZED IN THIS REPORT IS REPRESENTATIVE OF THE RESPONSES FROM A STATISTICALLY DIVERSE SET OF LOCAL AND STATE AGENCIES, BUT CANNOT BE INTERPRETED TO REPRESENT THE PUBLIC SAFETY COMMUNITY AS A WHOLE

- Surveys were distributed among local agencies of varying missions in direct proportion to the overall composition of the public safety community[3]

	Population	Sample	Responses	Response Rate
Campus Police	2,225	174	21	12.1%
Emergency	6,897	543	94	17.3%
Fire (paid and volunteer)	29,294	2,472	433	17.5%
Municipal Police	10,307	968	288	29.8%
County Sheriff	3,132	296	81	27.4%
Total	**51,837**	**4,453**	**917**	**20.6%**

[3] For purposes of the data characterization, the local agency types were combined into five agency missions: Law Enforcement, Fire, Emergency Medical Services (EMS), Combined Fire and EMS/Rescue, and All (Law Enforcement, Fire, EMS, EMS/Fire)

SURVEYS WERE DISTRIBUTED AMONG STATE AGENCIES IN AN EFFORT TO BE REPRESENTATIVE OF THE COMPOSITION OF THE OVERALL STATE PUBLIC SAFETY COMMUNITY[4]

	Sample	Responses	Response Rate
Corrections	42	24	57.8%
Emergency Management	38	14	36.8%
State Police	46	24	52.2%
Fire Marshall	7	7	100.0%
Emergency Medical Services	3	3	100.0%
Radio/IT	7	7	100.0%
Miscellaneous Public Safety	18	15	83.3%
Total	**161**	**94**	**58.4%**

[4] For purposes of the data characterization, the state agency types were combined into four agency missions: Law Enforcement, Fire/EMS, Emergency Management, Department of Public Safety

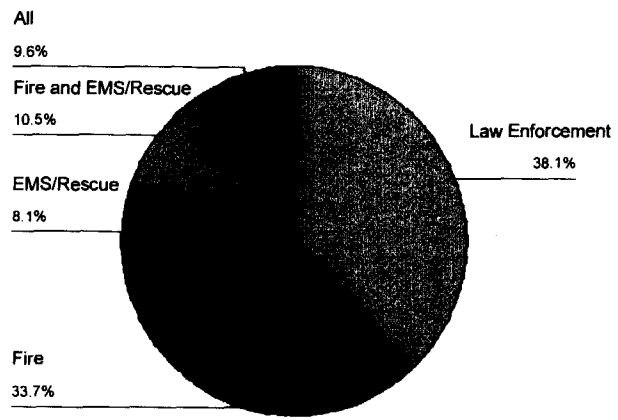
III. LOCAL AGENCIES' GENERAL SYSTEMS INFORMATION

THIS SECTION SUMMARIZES LOCAL AGENCY RESPONDENTS' GENERAL SYSTEMS INFORMATION

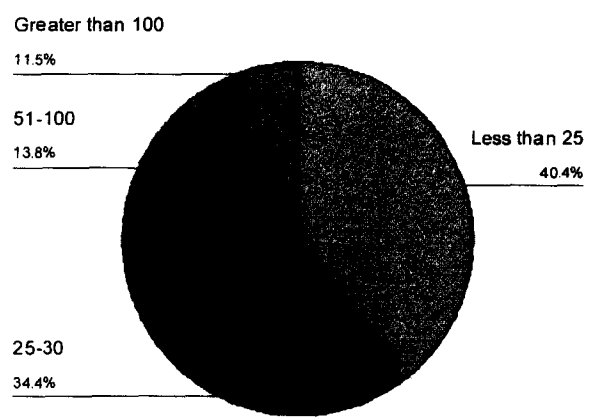
- This section covers the following set of system information
  - Local Agency Demographics
  - System Type
  - Operating Frequency
  - Shared Systems
  - Additional Types of Communications Supported

LOCAL AGENCY DEMOGRAPHICS

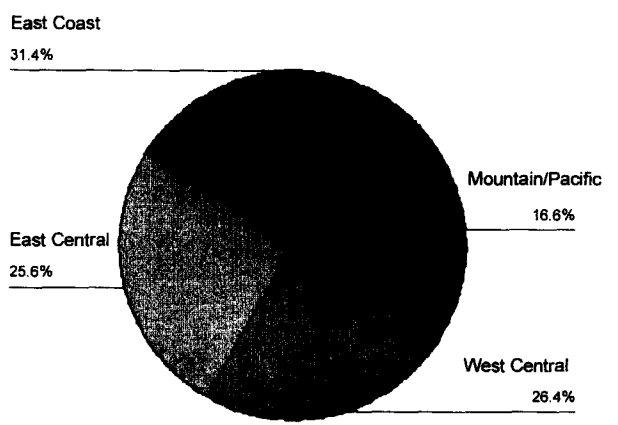
RESPONDING PUBLIC SAFETY AGENCIES



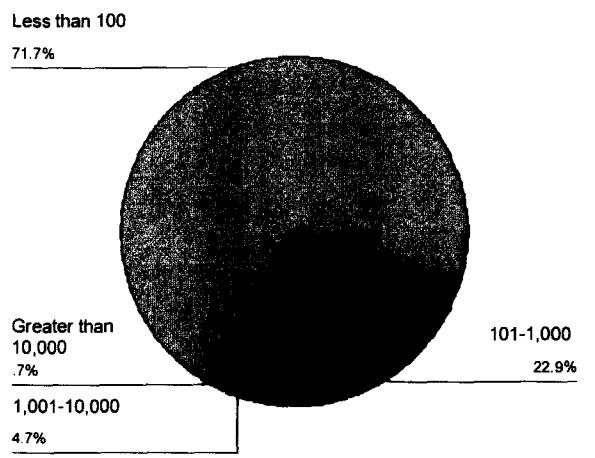
NUMBER OF USERS



GEOGRAPHY



JURISDICTION IN SQUARE MILES



FOR THE PURPOSE OF THIS REPORT, COLLECTED LOCAL AGENCY DATA ARE PRESENTED AND ANALYZED USING THE FOLLOWING KEY DEMOGRAPHIC GROUPINGS

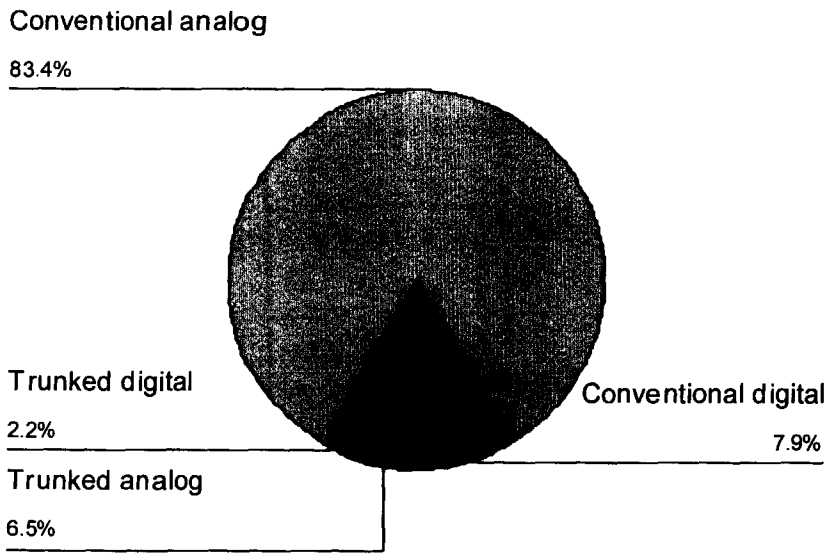
- Responding agencies are classified into five mission types with the following distribution:
  - Law Enforcement 38.1%
  - Fire 33.7%
  - EMS/Rescue 8.1%
  - Combined Fire and EMS/Rescue 10.5%
  - All 9.6%

- System size is determined by grouping the number of users into four groups with the following distribution:
  - Less than 25 users 40.4%
  - 25-50 users 34.4%
  - 51-100 users 13.8%
  - Greater than 100 users 11.5%

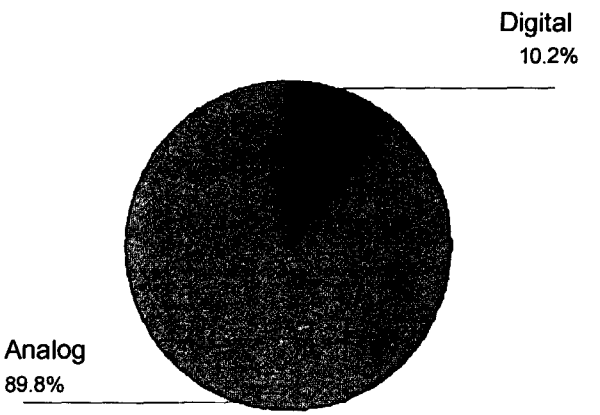
- Responding agencies are grouped into four geographic regions that were established by combining the nine United States census regions:
  - East Central (East North Central/East South Central) 25.6%
  - East Coast (Mid-Atlantic/South Atlantic/New England) 31.4%
  - Mountain/Pacific 16.6%
  - West Central (West North Central/West South Central) 26.4%

- Agency's coverage area is determined by grouping the jurisdiction size into four groups with the following distribution:
  - Less than 100 square miles 71.7%
  - 101 – 1,000 square miles 22.9%
  - 1,001 – 10,000 square miles 4.7%
  - Greater than 10,000 square miles 0.7%

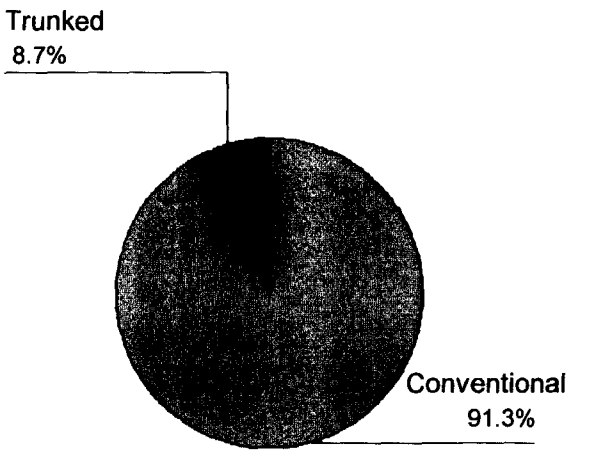
SYSTEM TYPE DISTRIBUTION FOR ALL RESPONDING LOCAL AGENCIES



ANALOG VERSUS DIGITAL DISTRIBUTION



CONVENTIONAL VERSUS TRUNKED DISTRIBUTION



IF LMR TECHNOLOGY CONTINUES TO MOVE TOWARD DIGITAL SYSTEMS, LOCAL AGENCIES WILL NEED TO DEDICATE SIGNIFICANT FINANCIAL RESOURCES TO MODERNIZATION

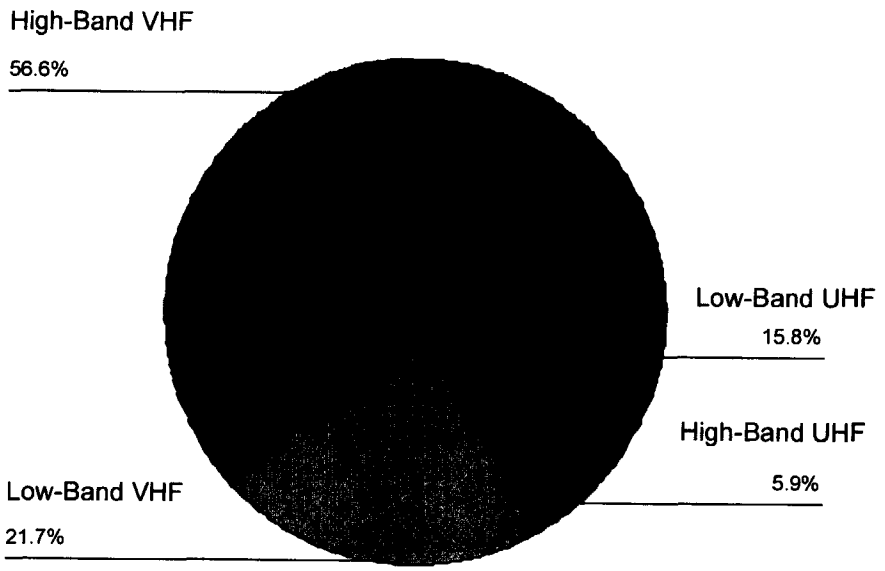
- Approximately 10% of all local respondents operate digital systems
  - Of those with digital systems, 78.2% operate conventional systems and 21.8% operate trunked systems
  - Nearly 90% of all local respondents report operating analog systems

- Local respondents with large systems—systems with greater than 100 users—have the most significant investment in digital technology
  - Over 18% of responding local agencies with more than 100 users operate digital systems
  - Trunked digital systems make up less than 1% of large local systems

- Regardless of their mission, responding local agencies have not made large-scale moves to replace conventional analog technology
  - More than 80% of agencies within each mission currently operate conventional analog systems

Note: Charts showing the distribution of system types by agency mission and number of users are included in Appendix A

OVERALL OPERATING FREQUENCY DISTRIBUTION FOR RESPONDING LOCAL AGENCIES



ALTHOUGH MORE SPECTRUM IS GENERALLY AVAILABLE IN THE 800 MHZ BAND, MANY LOCAL AGENCIES CONTINUE TO OPERATE THEIR SYSTEMS IN HIGH-BAND VHF

- Survey responses show that most local agencies operate in the High-Band VHF frequency range
  - 56.6% are in High-Band VHF while a relatively small percentage (5.9%) are in 800 MHz

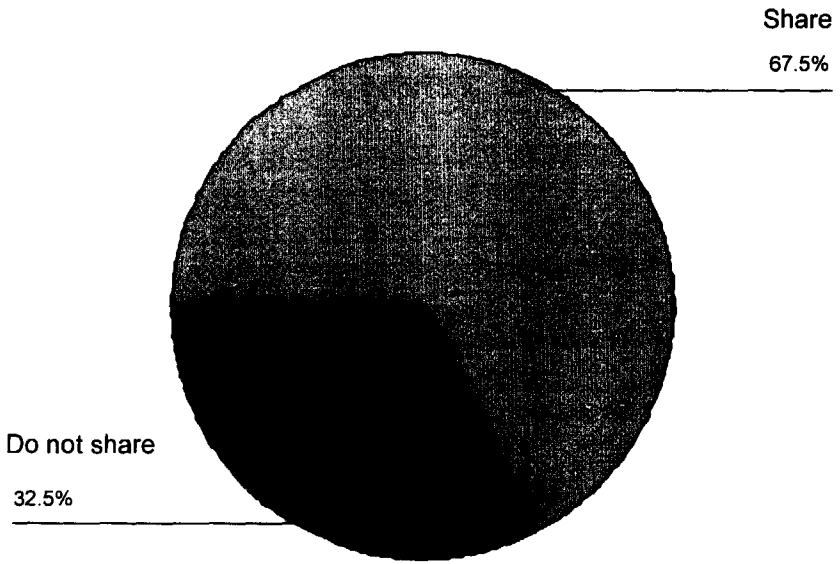
- Local law enforcement is more evenly distributed throughout the four major frequency bands than either fire or EMS agencies
  - A majority of local law enforcement agencies (49.2%) are in High-Band VHF; however, a significant portion (8.5%) of local respondents indicated that they operate 800 MHz systems
  - Local fire and EMS agencies do not have a significant number of systems in the 800 MHz band

- The geographic region of responding local agencies does not appear to have a significant impact on their chosen operating frequency; however, the following points are worth noting
  - East coast agencies use less High-Band VHF than agencies in other regions of the country
  - Responding agencies located in the Mountain/Pacific region are less inclined to operate 800 MHz systems

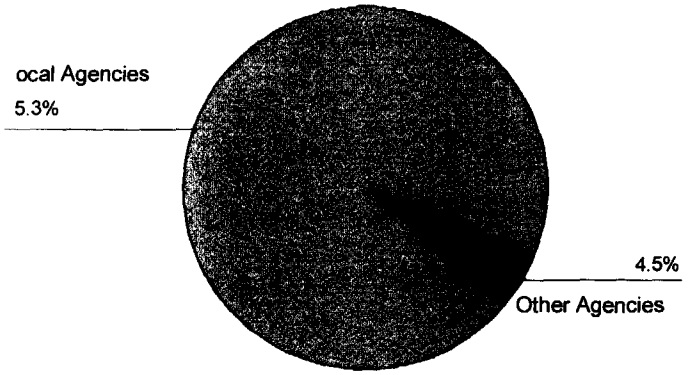
- Surprisingly, the largest percentage of 800 MHz systems was reported by responding local agencies whose jurisdiction covers more than 10,000 square miles
  - In general, it requires a significant number of towers to provide adequate 800 MHz coverage to a large land area, the costs of which can be significant

Note: Charts showing the distribution of operating frequency by agency mission, geographic region, and jurisdiction size are included in Appendix A

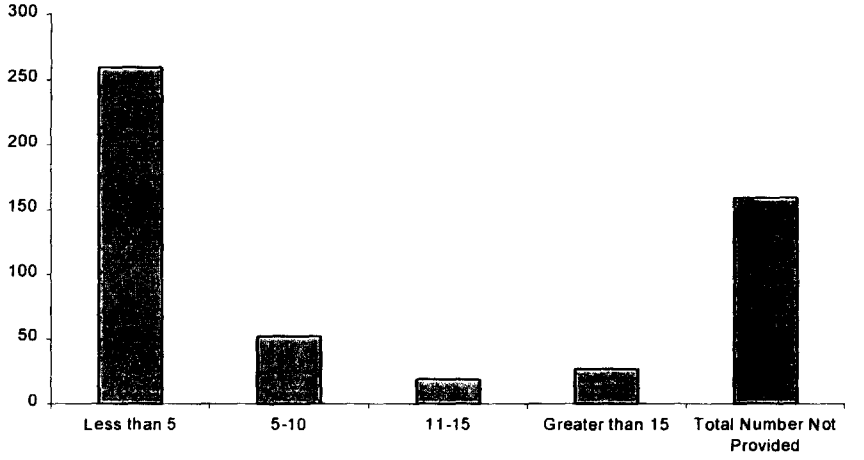
PERCENTAGE OF ALL LOCAL RESPONDENTS INDICATING THEY SHARE



PERCENTAGE OF ALL LOCAL RESPONDENTS INDICATING THE LEVEL OF GOVERNMENT WITH WHOM THEY SHARE



NUMBER OF LOCAL RESPONDENTS AND THE NUMBER OF AGENCIES WITH WHOM THEY SHARE



A MAJORITY OF LOCAL AGENCIES SHARE, IN SOME FASHION, THEIR RADIO COMMUNICATIONS RESOURCES WITH OTHER PUBLIC SAFETY AGENCIES

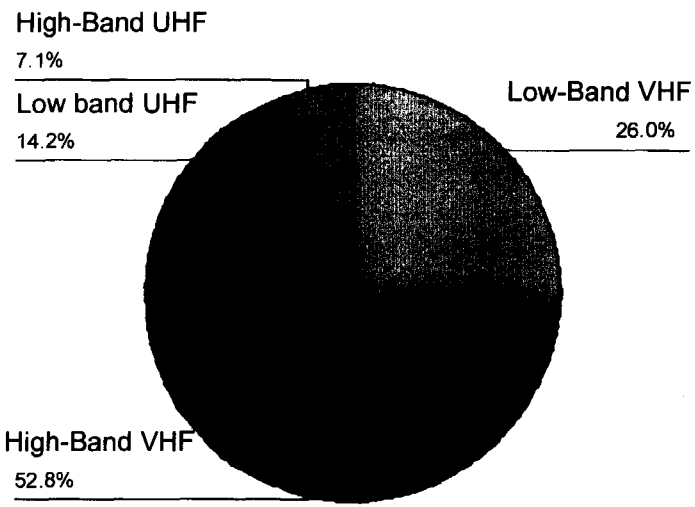
- Nearly 70% of all local respondents indicate sharing with other agencies
  - Agencies broadly define sharing; responses range from using a common radio frequency to using common infrastructure and equipment
  - Approximately two-thirds of the agencies that share indicate that another agency controls the network infrastructure for the radio system they use

- 93.5% of agencies that indicate sharing also report with whom they share
  - Of these respondents, 95.3% share solely with other local agencies
  - One of these local respondents (0.2%) indicates operating on a state-owned shared system
  - The remaining respondents (4.5%) indicate sharing with either state or federal, or a combination of local, state, and federal, public safety agencies

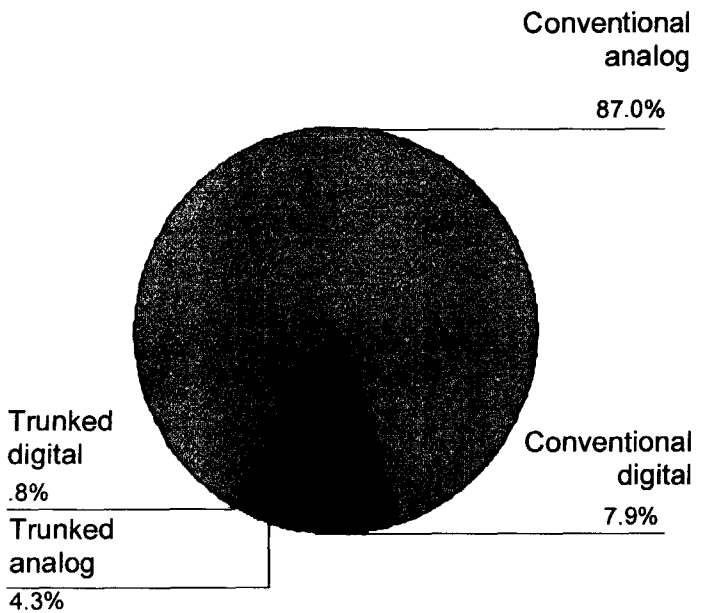
- Local agencies who indicate with whom they share generally share with a limited number of other agencies
  - 50% of local agencies who share do so with one to five other agencies
  - 13.7% shared with 5-15 agencies while only 5.3% share with more than 15 other agencies
  - Note that 31% of the local respondents who indicate sharing did not provide complete or sufficient information to determine the number and types of agencies with whom they share

Note: Charts that analyze sharing information by survey sampling bins are included in Appendix A

OPERATING FREQUENCY BAND DISTRIBUTION FOR LOCAL RESPONDENTS WHO SHARE



SYSTEM TYPE DISTRIBUTION FOR LOCAL RESPONDENTS WHO SHARE

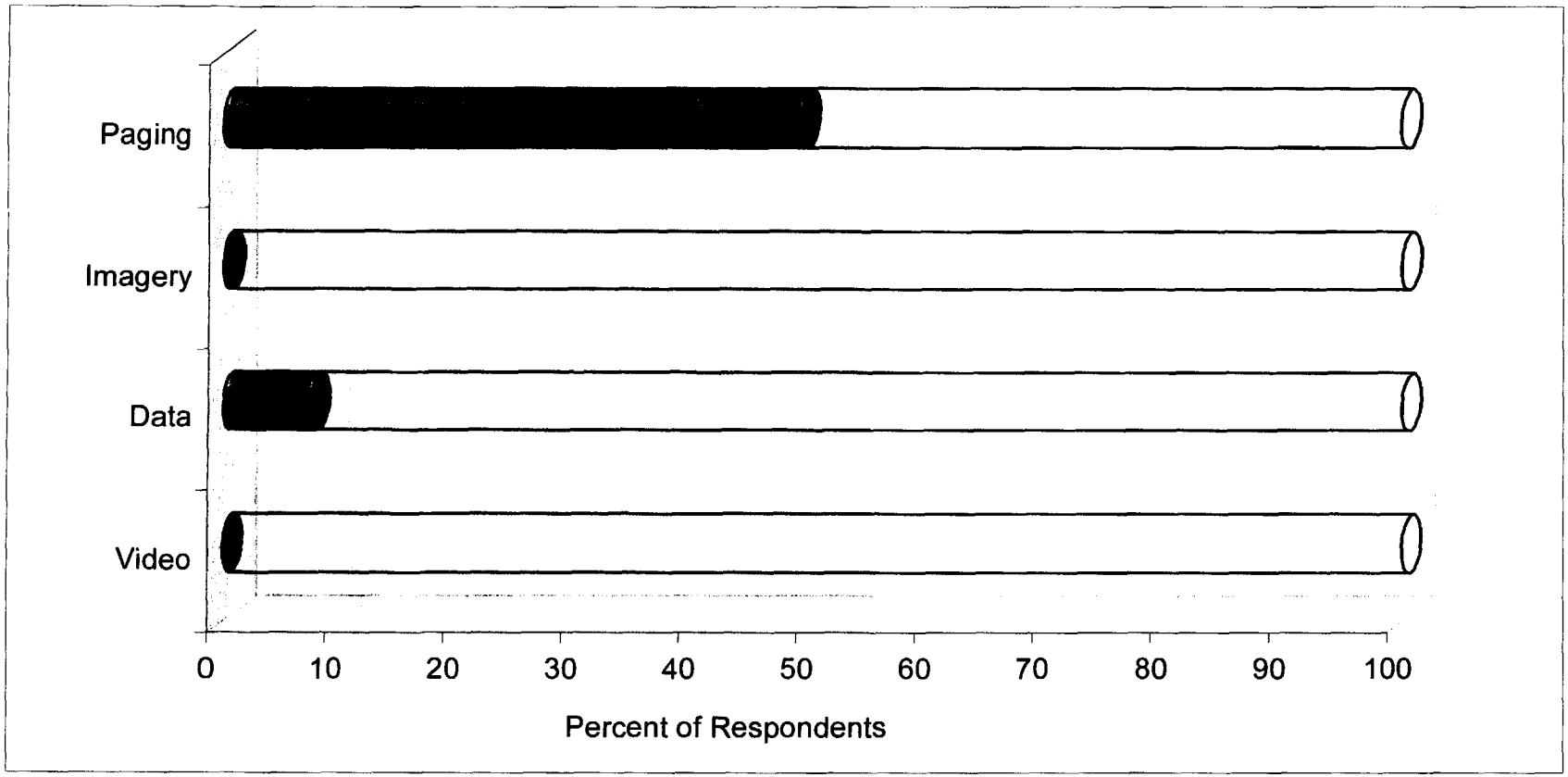


THE OPERATING FREQUENCY BANDS AND THE SYSTEM TYPES OF THOSE AGENCIES THAT SHARE MIRROR THE OVERALL PATTERNS FOR LOCAL PUBLIC SAFETY AGENCIES

- A majority (52.8%) of local respondents who share operate in High-Band VHF
  - A limited number (7.1%) who share operate in the 800 MHz band

- An overwhelming number of local sharing is done using conventional analog systems
  - Despite the technical advantages, less than 1% of sharing takes place using trunked digital systems
  - Additionally, only 7.9% of sharing takes place using conventional digital systems

PERCENTAGE OF ALL LOCAL RESPONDENTS WHO INDICATE SUPPORT FOR ADDITIONAL TYPES OF COMMUNICATIONS



MANY OF THE RESPONDING LOCAL AGENCIES WILL NEED TO UPGRADE THEIR RADIO SYSTEMS TO SUPPORT MORE ADVANCED COMMUNICATIONS CAPABILITIES

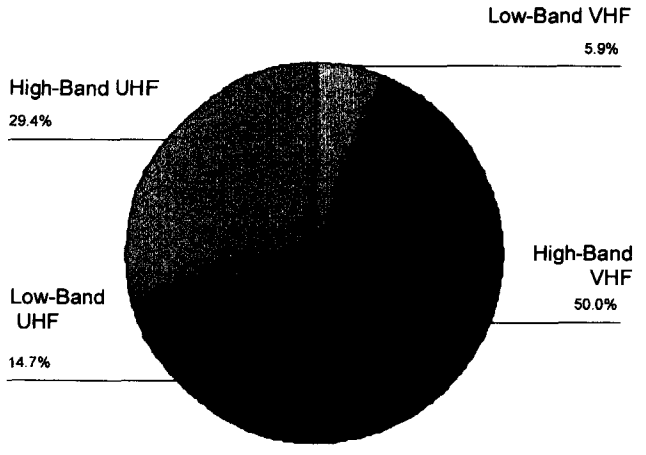
- In addition to voice communications, paging and data services are the primary types of communications supported by local public safety radio systems
  - A significant number (49.1%) of local LMR systems support paging
  - Only 7.9% of all local respondents currently use their system for data communications

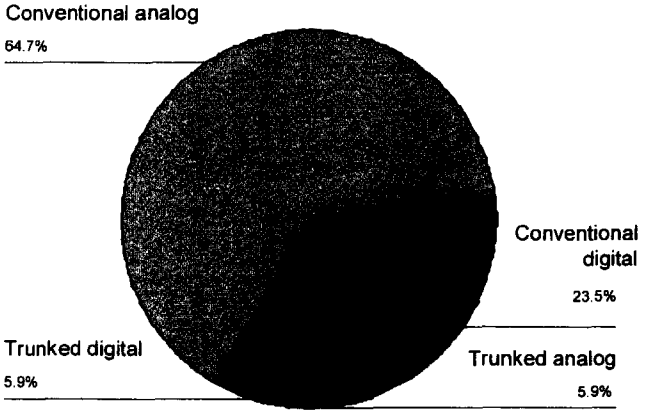
- Imagery and video technologies are just beginning to emerge as useful tools in helping local public safety agencies effectively complete their mission
  - Consequently, very few local respondents are using their radio systems for imagery and video transmissions

- Use of the most advanced types of communications tend to increase as the number of users on the system increase
  - The percentage of data-capable systems greatly increases with the number of users on the system
  - Paging capability is a more widely used technology; therefore, the percentage of paging-capable systems increases more gradually with the number of users on the system

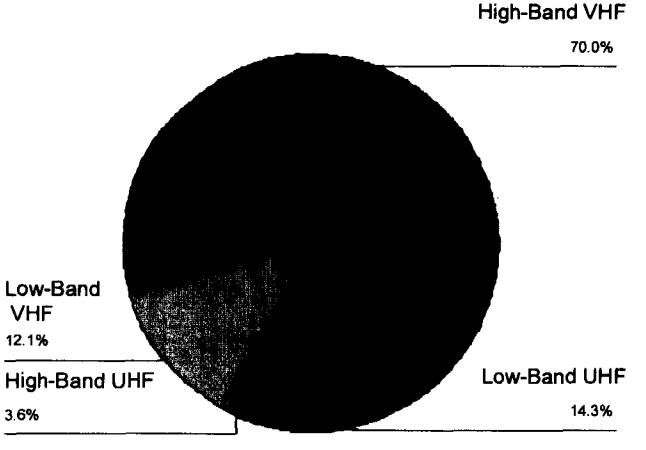
Note: Charts comparing paging and data capabilities by agencies number of users and mission are included in Appendix A

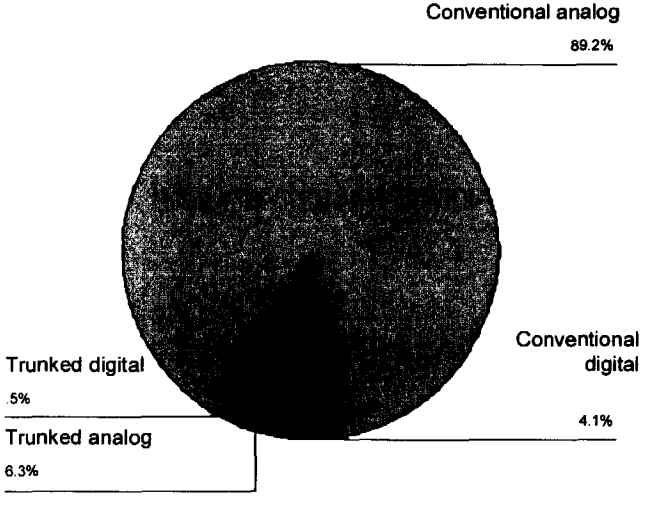
OPERATING FREQUENCIES AND SYSTEM TYPES OF LOCAL AGENCIES THAT SUPPORT DATA





OPERATING FREQUENCIES AND SYSTEM TYPES OF LOCAL AGENCIES THAT SUPPORT PAGING





LOCAL RESPONDENTS THAT ARE CURRENTLY USING MORE ADVANCED COMMUNICATIONS CAPABLITIES APPEAR TO BE MIGRATING TOWARD AN UPDATED LMR INFRASTRUCTURE

- Local respondents who indicated that they operate data-capable systems tend to have a more sophisticated radio infrastructure
  - A significant portion (29.4%) of local respondents who have data-capable systems operate in the 800 MHz band
  - A large number of these local respondents (also 29.4%) indicate that their systems are digital

- Of the local respondents that indicated their systems support data communications, a majority state they use mobile data terminals as the primary device for accessing data
  - 86.7% of those who indicated they support data communications use mobile data terminals (MDT); most of these local agencies have greater than 100 users on their system
  - A majority of the 13.3% that use mobile data computers (MDC) are local law enforcement agencies

- Local respondents who indicate that they operate LMR systems that support paging tend to have similar infrastructure characteristics to the overall public safety community
  - Of the respondents who have paging systems, 70% operate in High-Band VHF
  - 89.2% of respondents with paging capability operate conventional analog systems

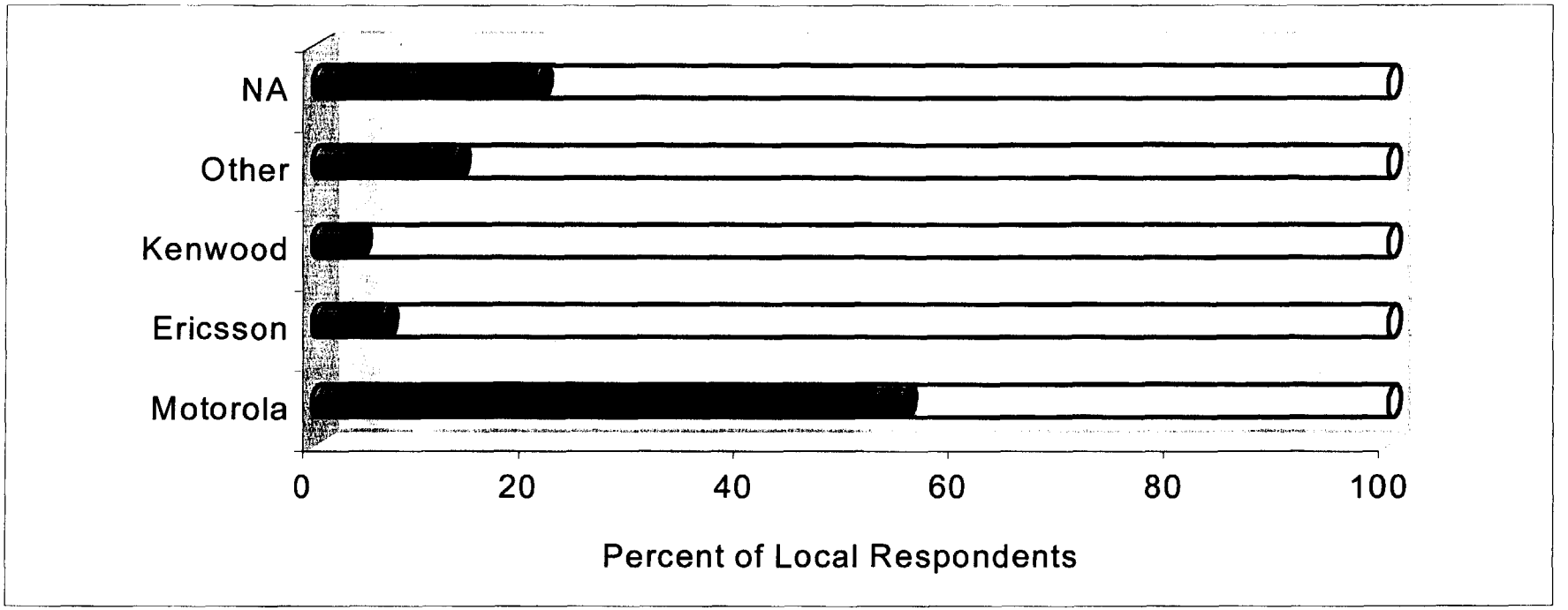
Note: Charts showing the total number of MDTs and MDCs used by agency mission and number of users are included in Appendix A

IV. LOCAL AGENCIES' USER EQUIPMENT INFORMATION

THIS SECTION SUMMARIZES LOCAL AGENCY RESPONDENTS' USER EQUIPMENT INFORMATION

- This section covers the following information:
  - Portable Radio Vendors
  - Portable Radio Types
  - Portable Radio Security
  - Mobile Radio Vendors
  - Mobile Radio Types
  - Mobile Radio Security

DISTRIBUTION OF PORTABLE RADIO VENDORS (LOCAL RESPONDENTS)



Note: "NA (Not Available)" represents those respondents who did not indicate portable radio vendors.
"Other" includes Transcrypt (E.F. Johnson), Bendix-King, ICOM, Maxon, Midland, Pantec, Patriot, Radius, Regency, Relm, Repco, Ritron, Standard, Uniden, Vertex, Wilson, and Yaesu

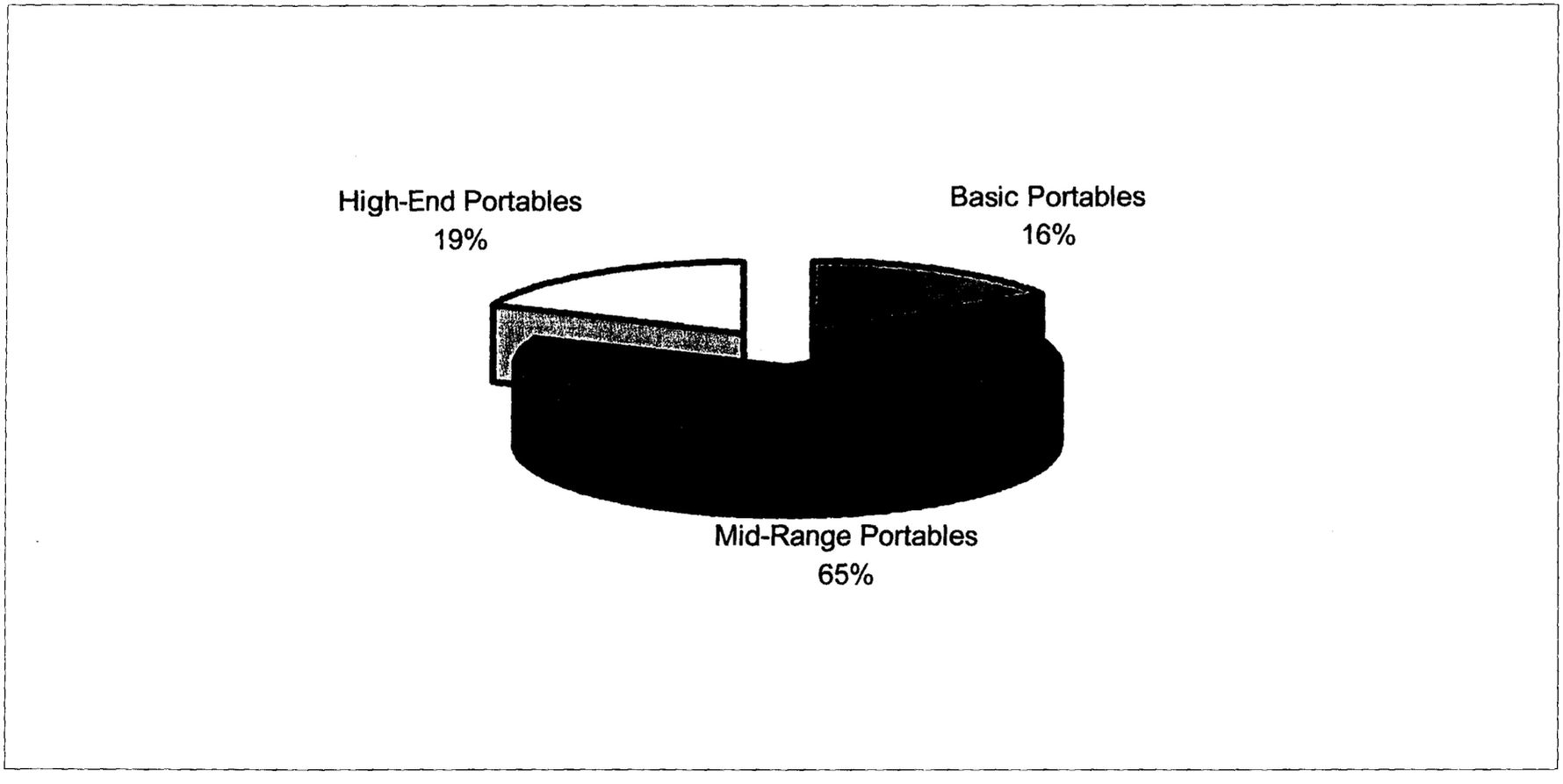
THE LOCAL PUBLIC SAFETY PORTABLE RADIO MARKET IS PRIMARILY SUPPLIED BY ONE VENDOR

- There may be an opportunity to reduce portable radio costs by increasing market competition
  - Motorola is the portable radio vendor for nearly 60% of local respondents
  - Ericsson is the second largest portable radio vendor, but has only a 6.6% share of the local public safety market
  - Kenwood is the third largest provider of portable radios (4%)

- Local survey responses indicate that there are over fifteen additional portable radio vendors
  - Those vendors appear to fragment the smallest portion of the portable market and offer limited competition to the primary vendor, Motorola

- A significant number of local respondents did not indicate which vendor supplied their portable radio
  - The vendor section of the *LMR Equipment and Infrastructure Survey* was optional

DISTRIBUTION OF THE TYPES OF PORTABLE RADIOS
(LOCAL RESPONDENTS)



LOCAL RESPONDING AGENCIES INDICATE THEY ARE USING PRIMARILY MID-RANGE PORTABLE RADIOS

- For the purposes of the cost study activity, portable radios were divided into three categories:
  - **Basic portable radios** are capable of supporting less than ten channels and have a limited number of features
  - **Mid-range portable radios** are capable of supporting ten to fifty channels and may have an increased number of features (i.e., keypad, alphanumeric display, or programmable buttons)
  - **High-end portable radios** are capable of supporting more than fifty channels and generally have a number of additional features (i.e., keypad, 7-8 digit alphanumeric keypad, several programmable buttons, phone interconnect, capability for software upgrade)

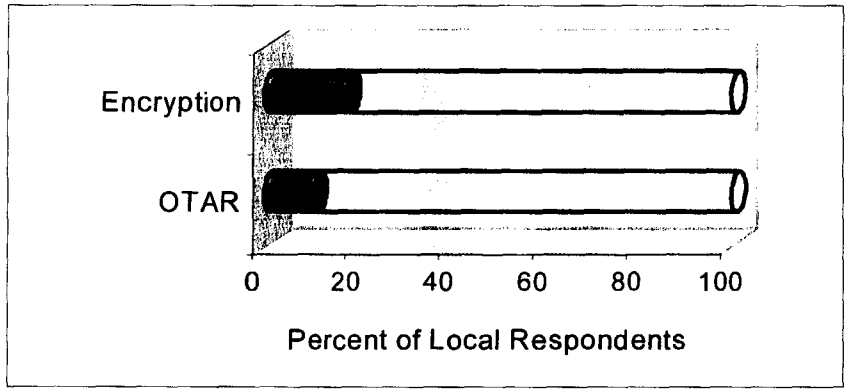
- Based on local agency survey responses, agency mission appears to impact the level of portable radio sophistication
  - Local law enforcement agencies use the largest percent of high-end portable radios (30.9%)
  - Of responding local EMS/Rescue agencies, only 4.6% use high-end portable radios

- As the number of users on a system increases, local agencies appear to employ a larger percentage of more advanced portable radios
  - Local agencies with greater than 51 users on their system tend to have nearly twice the percentage of high-end portables as those local agencies with 50 or fewer users on the system

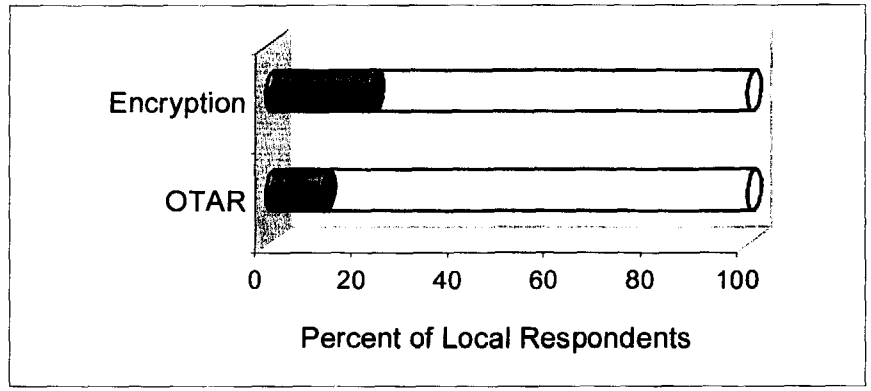
Note: Charts comparing the types of portable radios distributed by an agencies mission and number of users are included in Appendix B

OVER THE AIR REKEYING (OTAR) AND ENCRYPTION ON PORTABLE RADIOS (LOCAL RESPONDENTS)

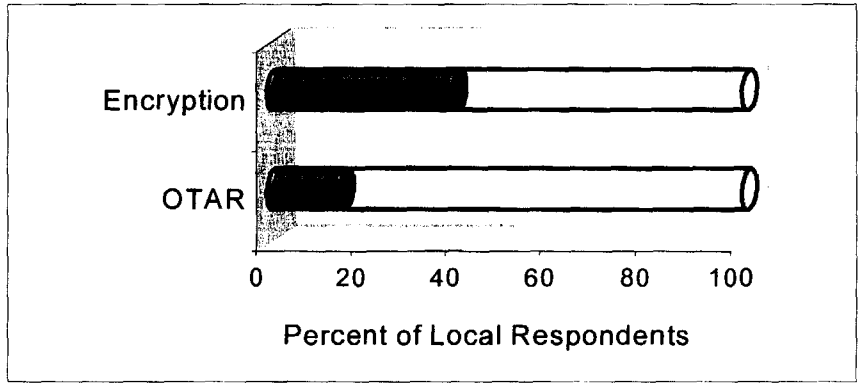
BASIC PORTABLES



MID-RANGE PORTABLES



HIGH-END PORTABLES



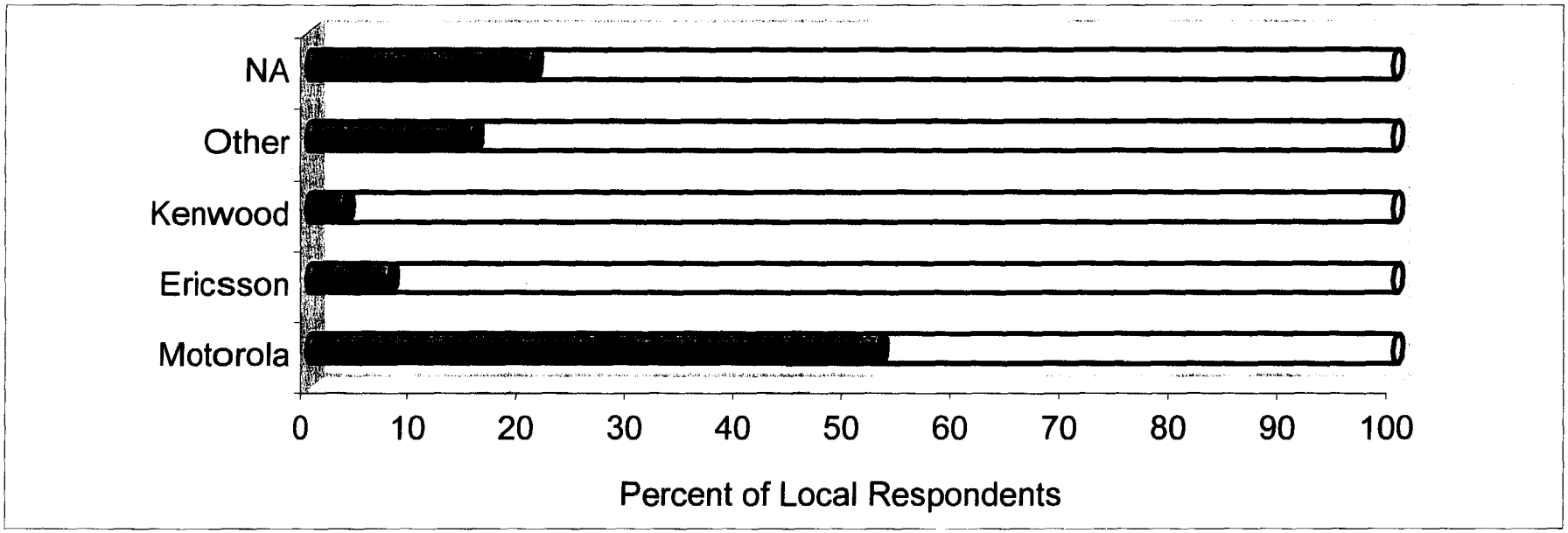
RESPONDING LOCAL PUBLIC SAFETY AGENCIES ARE ADDING OPTIONAL FEATURES TO HELP IMPROVE THE SECURITY OF THEIR RADIO SYSTEMS

- Encrypted radios are becoming necessary for local public safety agencies to effectively perform their mission
  - The use of encryption varies only slightly from basic to high-end radios suggesting the addition of this technology to all radios
  - Survey responses indicate that local law enforcement agencies use the highest percentage of encrypted radios
  - Nearly 40% of high-end portable radios are encryption-capable

- Over the air rekeying (OTAR) is a more advanced technology that simplifies the keying process on encrypted radios
  - A significant percentage (nearly 50%) of responding local agencies who have radios with encryption capability also have OTAR

Note: Charts comparing use of OTAR and encryption technology in portable radios by agency mission are included in Appendix B

DISTRIBUTION OF MOBILE RADIO VENDORS
(LOCAL RESPONDENTS)



Note: "NA (Not Available)" represents those respondents who did not indicate mobile radio vendors.
"Other " includes Transcrypt (E.F. Johnson), Bendix-King, ICOM, Maxon, Midland, Pantec, Patriot, Radius, Regency, Relm, Repco, Ritron, Standard, Uniden, Vertex, Wilson, and Yaesu

THE LOCAL MARKET FOR MOBILE RADIOS MIRRORS THE LOCAL MARKET FOR PORTABLE RADIOS

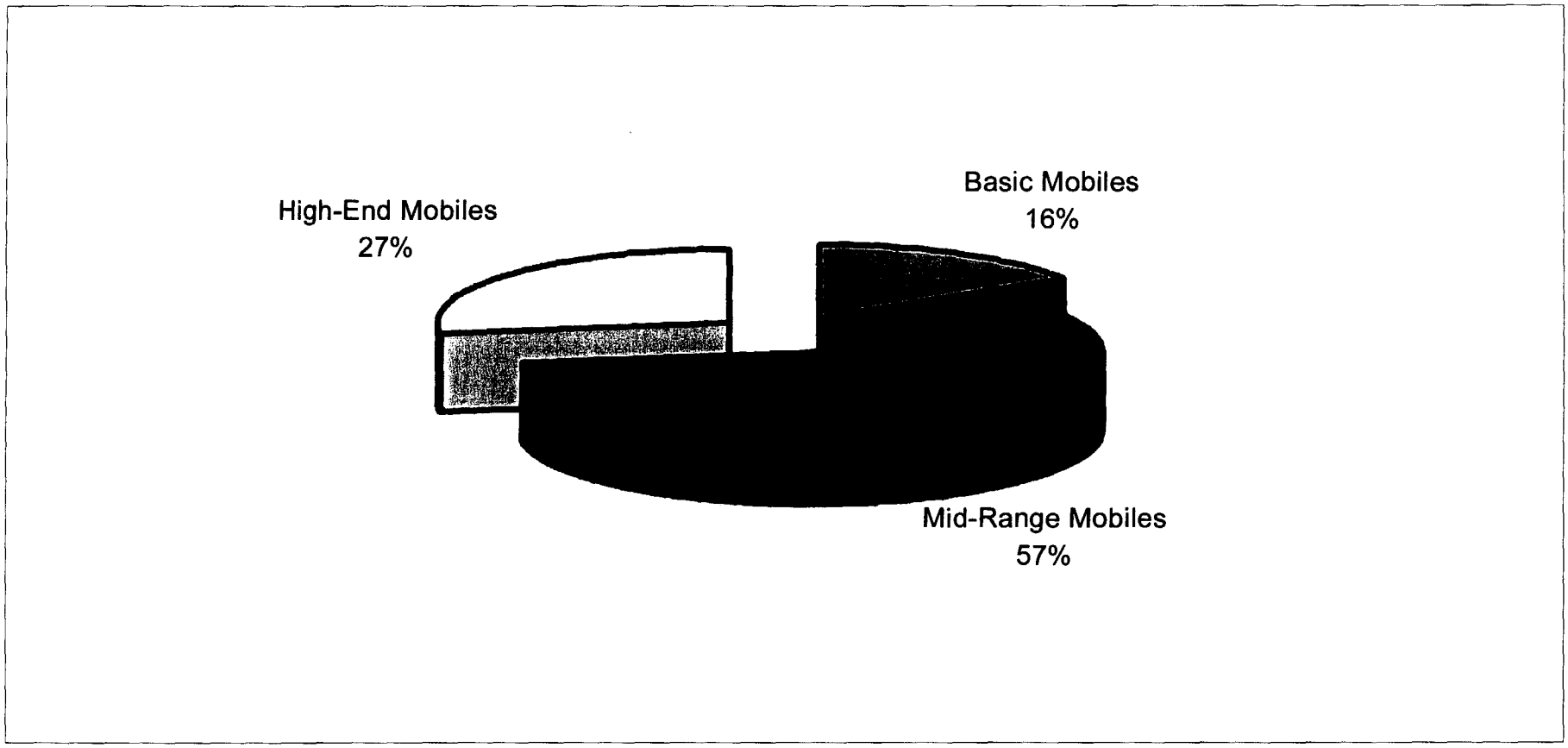
- Most of the responding local agencies use the same vendor for both mobile and portable radios
  - 87.6% of the local respondents that use Motorola portable radios also use Motorola mobile radios
  - 75.9% of the local respondents that use Ericsson portable radios also use Ericsson mobile radios
  - 65.6% of the local respondents that use Kenwood portable radios also use Kenwood mobile radios

- Similar to portable radios, there is limited competition in the mobile radio market
  - Motorola is the mobile radio vendor for over 50% of local respondents
  - Ericsson is the second largest mobile radio vendor, but has only a 7.6% market share of local respondents

- Survey responses indicate that there are over fifteen additional mobile radio vendors
  - These vendors appear to fragment the smallest portion of the mobile radio market and offer limited competition to the primary vendor, Motorola

- A significant number of local respondents did not indicate which vendor supplied their mobile radios
  - The vendor section of the *LMR Equipment and Infrastructure Survey* was optional

DISTRIBUTION OF TYPES OF MOBILE RADIOS
(LOCAL RESPONDENTS)



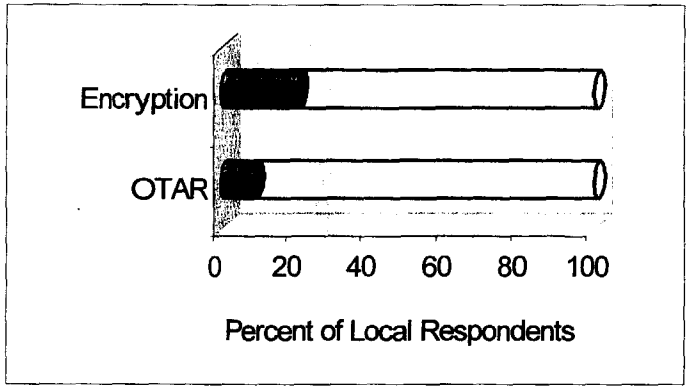
RESPONDING LOCAL PUBLIC SAFETY AGENCIES USE ENCRYPTION AND OTAR IN APPROXIMATELY THE SAME PERCENTAGES ON MOBILE AND PORTABLE RADIOS

- As stated earlier, encrypted radios are becoming necessary for local public safety agencies to effectively perform their mission
  - The use of encryption varies only slightly from basic to high-end radios indicating the addition of this technology to all types of radios
  - Survey responses indicate that local law enforcement agencies use the highest percentage of encrypted radios
  - Nearly 40% of high-end mobile radios are encryption capable

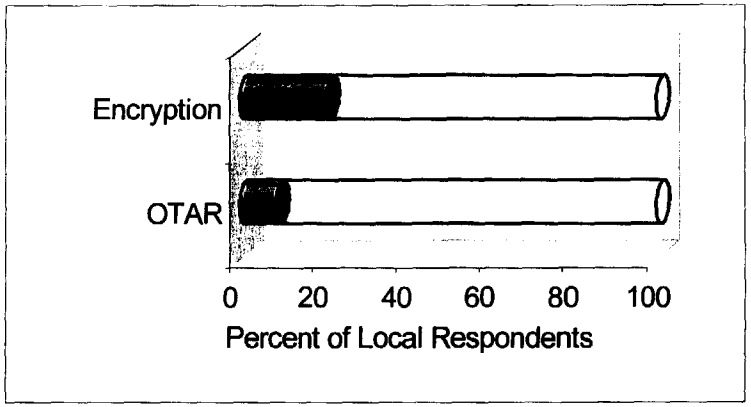
- OTAR is a more advanced technology that simplifies the keying process on encrypted radios
  - A significant percentage (nearly 50%) of responding local agencies who have radios with encryption capability also have OTAR

OVER THE AIR REKEYING AND ENCRYPTION ON MOBILE RADIOS (LOCAL RESPONDENTS)

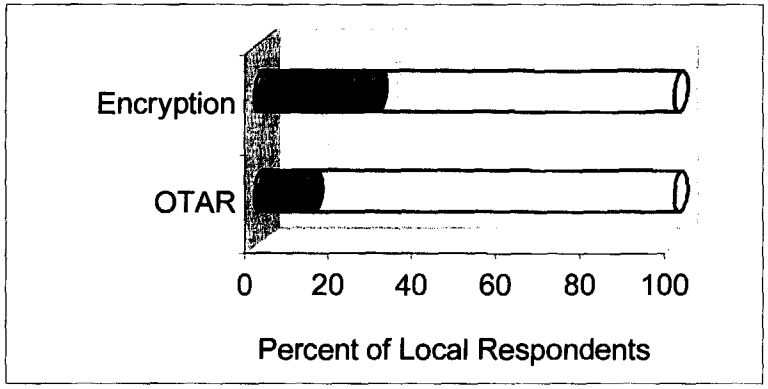
BASIC MOBILES



MID-RANGE MOBILES



HIGH-END MOBILES



V. LOCAL AGENCIES' NETWORK EQUIPMENT INFORMATION

THIS SECTION SUMMARIZES LOCAL AGENCY RESPONDENTS' NETWORK EQUIPMENT INFORMATION

- This section covers the following information:
  - Base Stations
  - Repeaters
  - Antenna Towers
  - Dispatch and Control
  - Automatic Vehicle Locator
  - Computer Aided Dispatch
  - Network Equipment Vendors

AMONG THE LOCAL AGENCIES INDICATING THAT THEY OWN AT LEAST ONE BASE STATION, THE AVERAGE NUMBER OF BASE STATIONS USED INCREASES DRAMATICALLY AS THE REQUIREMENTS FOR THE SYSTEM INCREASE

- The average number of base stations significantly increases when the coverage area is larger than 10,000 square miles

- Similarly, the number of base stations significantly increases when a local agency has more than 100 users on the system

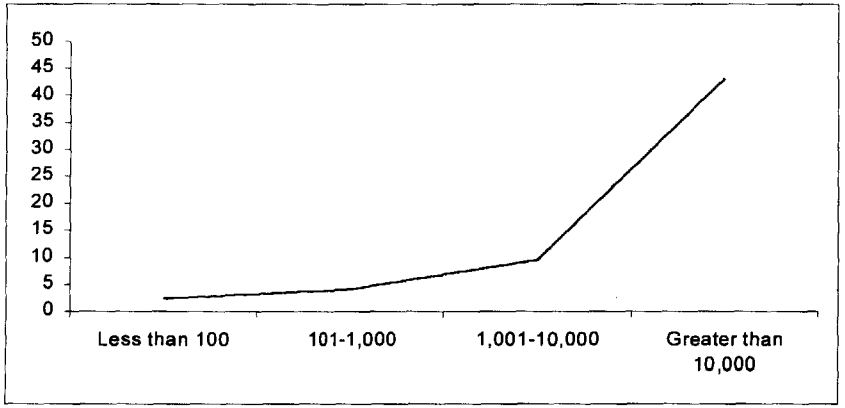
- The average number of base stations is relatively consistent regardless of local agencies' missions
  - Local respondents that indicate they consist of all mission types average nearly six base stations per system
  - Local EMS/Rescue respondents operate the fewest base stations, averaging slightly over one per system

- Most local public safety agencies operate desktop base stations
  - Cabinet mounted 29.8%
  - Rack mounted 11.1%
  - Desktop 59.1%

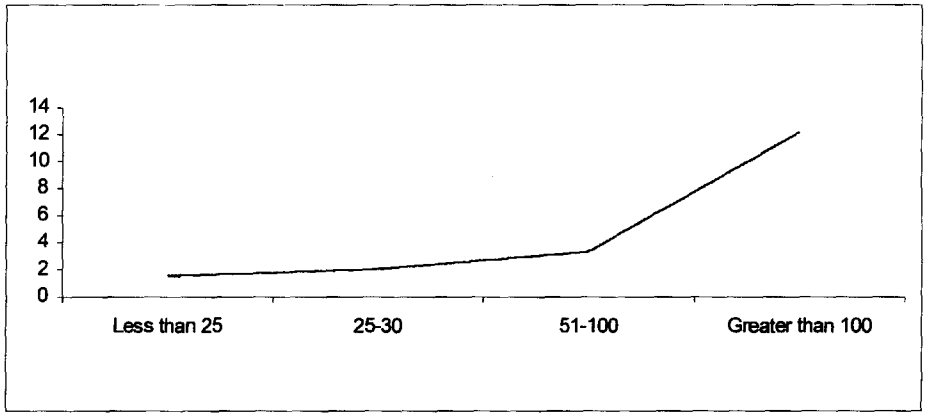
- A majority of local public safety agencies operate low power LMR base stations
  - Under 100 Watts 64.6%
  - 100 – 149 Watts 28.4%
  - Greater than 150 Watts 7%

AVERAGE NUMBER OF BASE STATIONS BY AGENCY TYPE, AGENCY SIZE, AND JURISDICTION SIZE FOR LOCAL RESPONDENTS

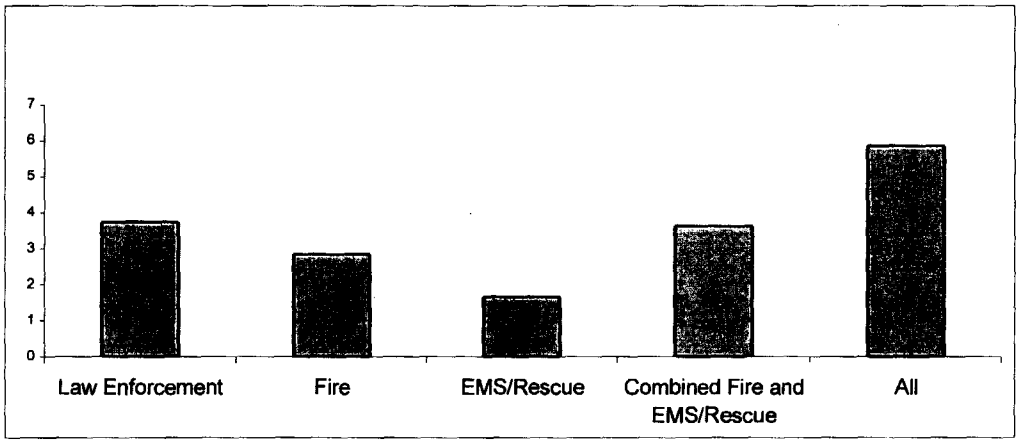
AVERAGE NUMBER OF BASE STATIONS BY JURISDICTION SIZE IN SQUARE MILES



AVERAGE NUMBER OF BASE STATIONS BY NUMBER OF USERS



AVERAGE NUMBER OF BASE STATIONS BY AGENCY MISSION



AMONG THE LOCAL AGENCIES INDICATING THAT THEY OWN AT LEAST ONE REPEATER, COVERAGE AREA AND SYSTEM SIZE APPEAR TO EFFECT THE NUMBER OF REPEATERS IN THE SYSTEM

- The average number of repeaters increases steadily with the jurisdiction size
  - The most significant growth is seen in local agencies covering between 1,000 and 10,000 square miles

- The average number of repeaters is relatively consistent among local respondents that have less than 100 users
  - The average number of repeaters grows significantly among local agencies that operate systems of greater than 100 users

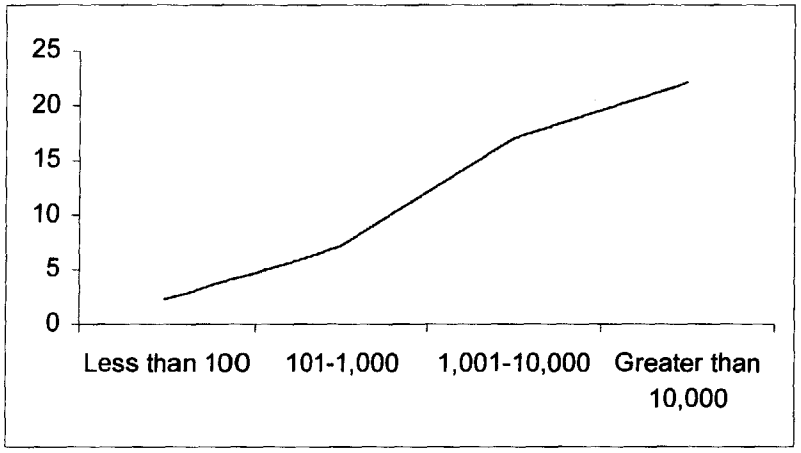
- Local law enforcement and systems that support multiple missions (All) tend to have the largest number of repeaters

- Repeaters tend to be more securely mounted than base stations
  - Cabinet mounted 48.4%
  - Rack mounted 32.6%
  - Desktop 19%

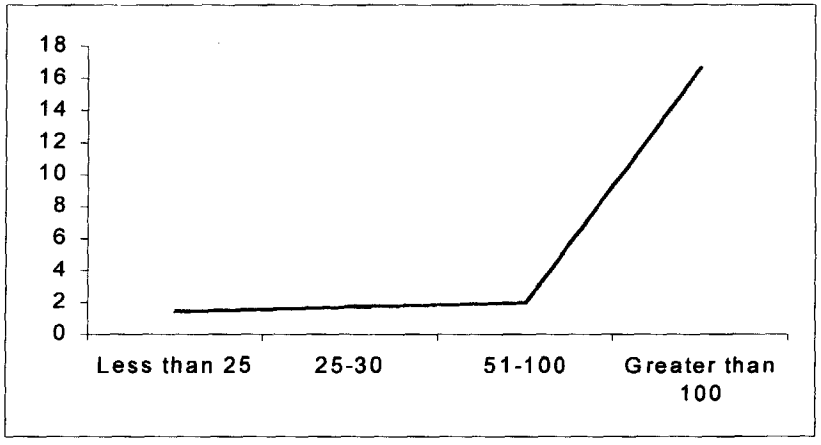
- Repeaters tend to have higher output power than base stations
  - Under 100 Watts 23.5%
  - 100 – 149 Watts 61%
  - Greater than 150 Watts 15.5%

AVERAGE NUMBER OF REPEATERS BY AGENCY TYPE AGENCY SIZE, AND JURISDICTION SIZE FOR LOCAL RESPONDENTS

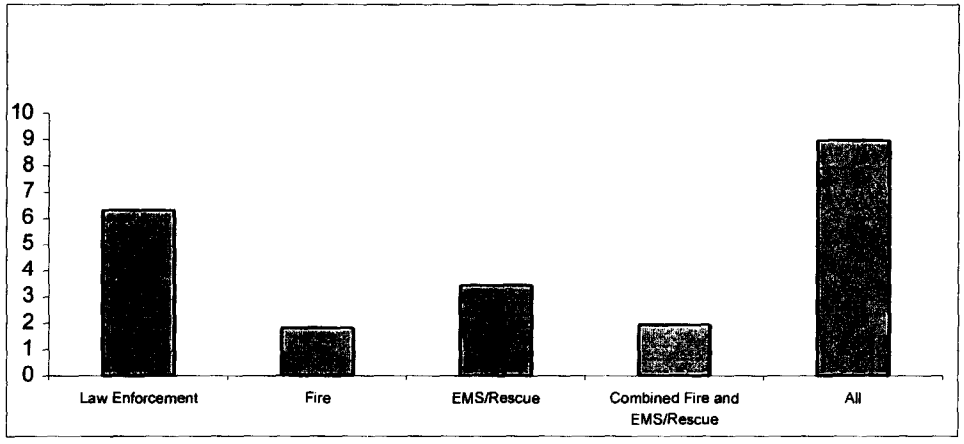
AVERAGE NUMBER OF REPEATERS BY JURISDICTION SIZE IN SQUARE MILES



AVERAGE NUMBER OF REPEATERS BY NUMBER OF USERS



AVERAGE NUMBER OF REPEATERS BY AGENCY MISSION



LOCAL RESPONDENTS WHO OWN AT LEAST ONE TOWER HAVE INDICATED THAT THE NUMBER OF TOWERS USED IS PRIMARILY AFFECTED BY THE SIZE OF THEIR JURISDICTION

- Local agency responses show a positive correlation between the coverage area of a jurisdiction (in square miles) and the number of antennas used in the system

- Additionally, the number of users operating on a system affects the number of towers used
  - The average number of towers remains fairly constant for local systems with less than 100 users, but grows significantly for larger systems with more than 100 users

- A majority of responding local public safety agencies (56.5%) did not indicate that they own their own towers
  - When the local responding sample was analyzed as a whole, the average number of towers owned per system was less than one
  - These local agencies may share systems with other agencies or may lease towers

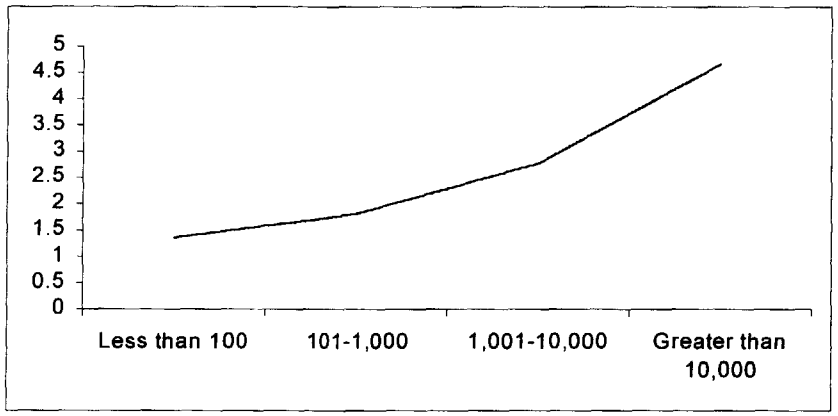
- Very few of the local respondents (6%) indicate that they use microwave links to interconnect their towers

- Responding local agencies indicate that their antenna towers are constructed in the following manner:

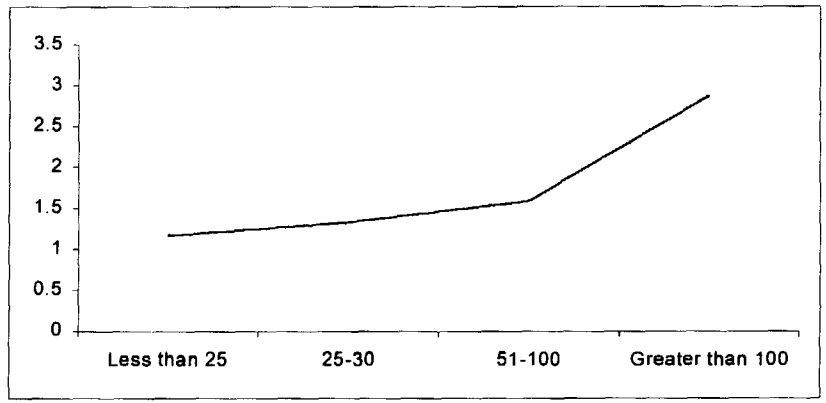
	Percentage of Towers	Average Height of Towers (in feet)
Monopole	10.6%	47
Self-supported (freestanding)	56.8%	64
Guyed (supported by wire)	32.6%	94.6

AVERAGE NUMBER OF ANTENNA TOWERS BY AGENCY TYPE, AGENCY SIZE, AND JURISDICTION SIZE FOR LOCAL RESPONDENTS

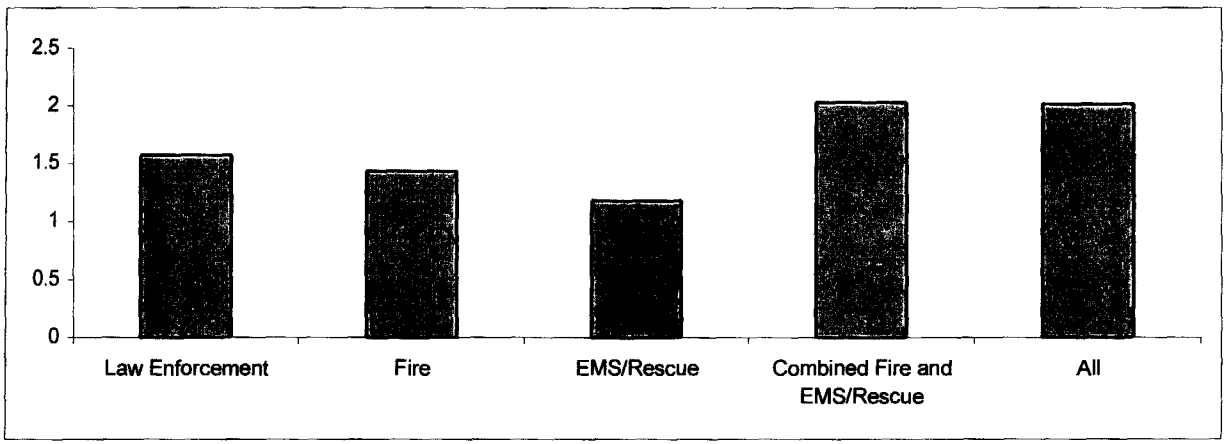
AVERAGE NUMBER OF ANTENNA TOWERS BY JURISDICTION SIZE IN SQUARE MILES



AVERAGE NUMBER OF ANTENNA TOWERS BY NUMBER OF USERS



AVERAGE NUMBER OF ANTENNA TOWERS BY AGENCY MISSION



A LOCAL AGENCY'S SIZE EFFECTS THE NUMBER OF DISPATCH CONSOLES AND DESKTOP CONTROLLERS USED IN THEIR SYSTEM

- The average number of dispatch consoles is fairly consistent for local systems with less than 100 users
  - There is a significant increase in the average number of dispatch consoles in systems with greater than 100 users

- The average number of dispatch consoles is significantly higher for local systems that support multiple missions
  - On average, the local respondents indicate that they have approximately nine dispatch consoles
  - Local respondents with more specific missions consistently report operating approximately two dispatch consoles

- 75% of local respondents' dispatch consoles control between three and five channels

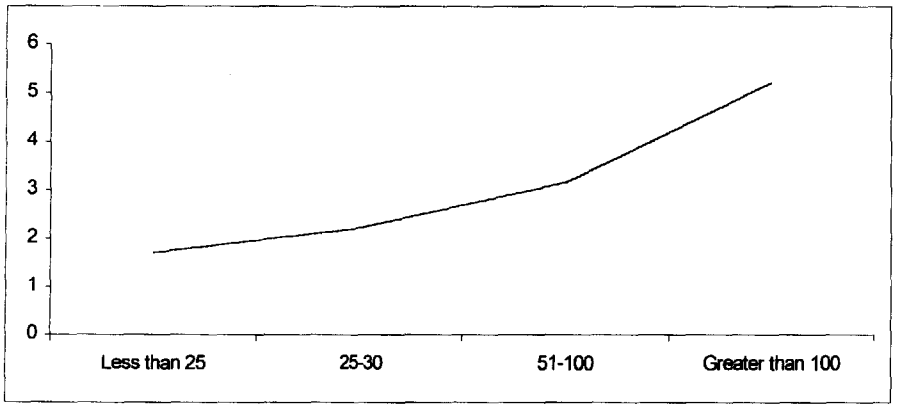
- Local respondents indicate that their dispatch console supports the following additional functions:
  - 38.3% indicate that their console supports a paging encoder
  - 20.5% indicate that their console supports a start-alert signal
  - 14.3% indicate that their console supports supervisory control
  - 2.6% indicate that their console supports Graphical User Interface (GUI)
  - 15.4% indicate that their console supports telephone patching

- Many local respondents use desktop controllers, which provide control over radios and base stations from remote locations, to support their mission
  - The average number of desktop controllers steadily increases with the size of the agency

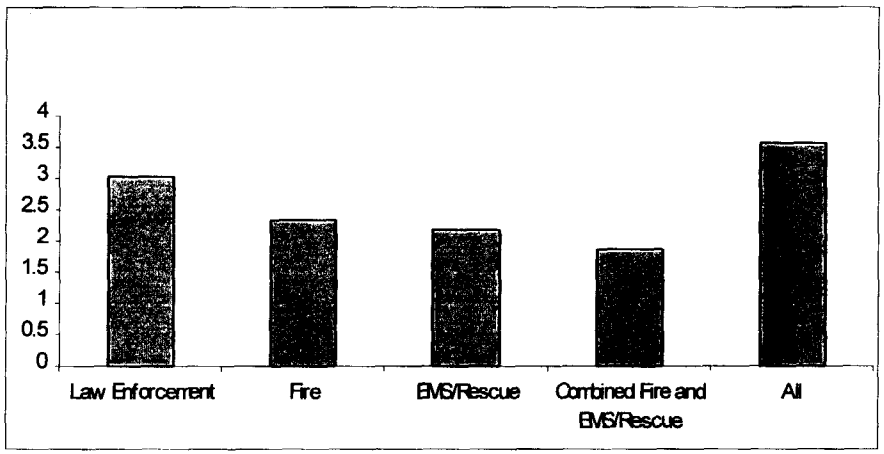
Note: Charts showing the number of channels and additional functions supported by dispatch consoles are shown in Appendix C

AVERAGE NUMBER OF DESKTOP CONTROLLERS AND DISPATCH CONSOLES BY MISSION TYPE FOR LOCAL RESPONDENTS

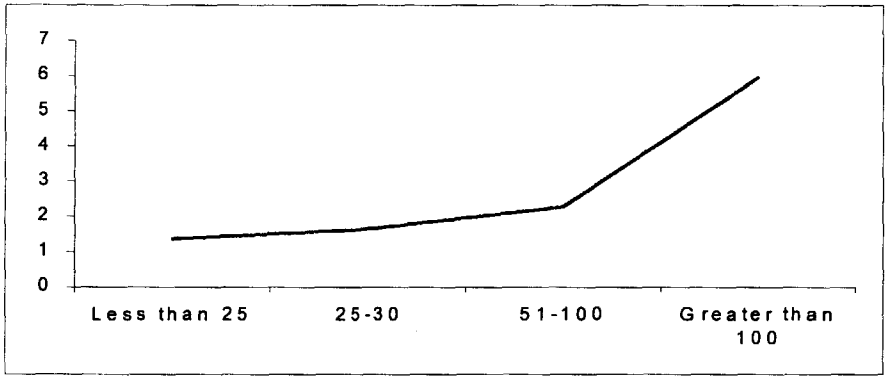
AVERAGE NUMBER OF DESKTOP CONTROLLERS BY AGENCY SIZE



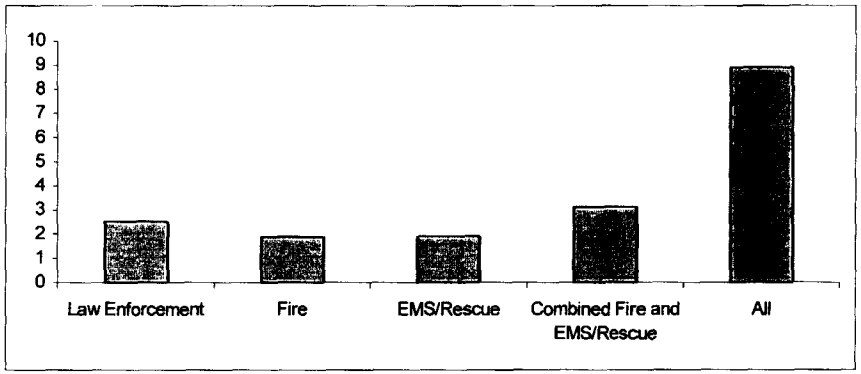
AVERAGE NUMBER OF DESKTOP CONTROLLERS BY MISSION TYPE



AVERAGE NUMBER OF DISPATCH CONSOLES BY AGENCY SIZE



AVERAGE NUMBER OF DISPATCH CONSOLES BY MISSION TYPE

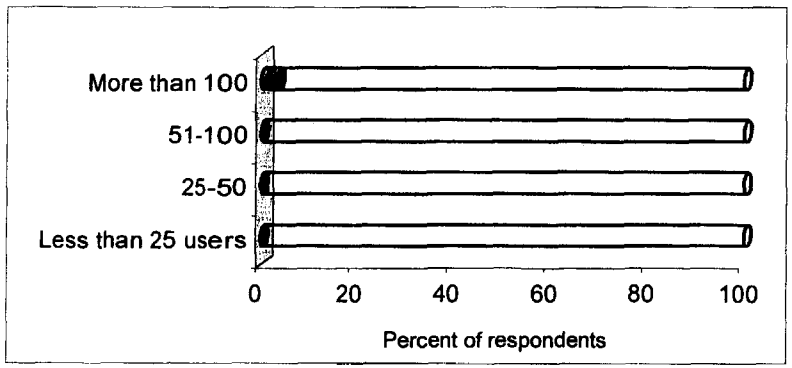


RESPONDING LOCAL AGENCIES ARE BEGINNING TO USE ADVANCED TECHNOLOGIES TO IMPROVE THE EFFICIENCY AND CAPABILITY OF THEIR DISPATCHERS

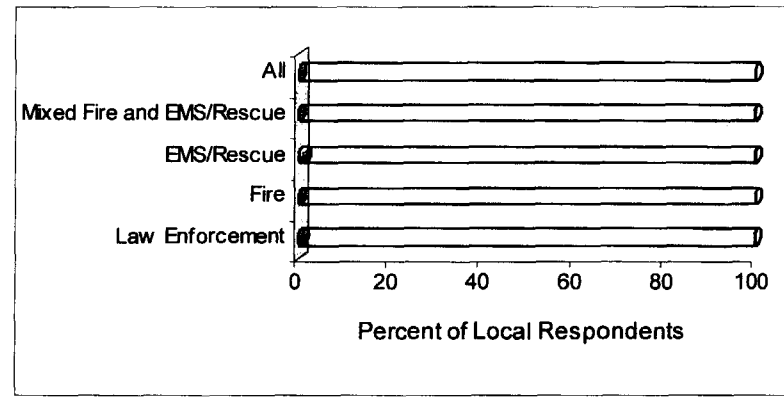
- The percent of local respondents indicating that they use computer aided dispatch (CAD) increases steadily as the number of users on the system increases
  - Nearly 40% of local respondents with more than 100 users indicate that they use CAD
  - A limited number (less than 5%) of local agencies with less than 25 users support CAD
- Local respondents that support multiple missions are more likely to support CAD systems
- Automatic Vehicle Locator (AVL) technology does not appear to be widespread among the local agencies responding to the survey
  - Less than 1% of responding local agencies indicated use of AVL technology, all of which were agencies with greater than 100 users on their system
  - Local law enforcement and EMS/Rescue are the only types of agencies that indicated use of AVL technology

AUTOMATIC VEHICLE LOCATOR AND COMPUTER AIDED DISPATCH BY MISSION TYPE FOR LOCAL RESPONDENTS

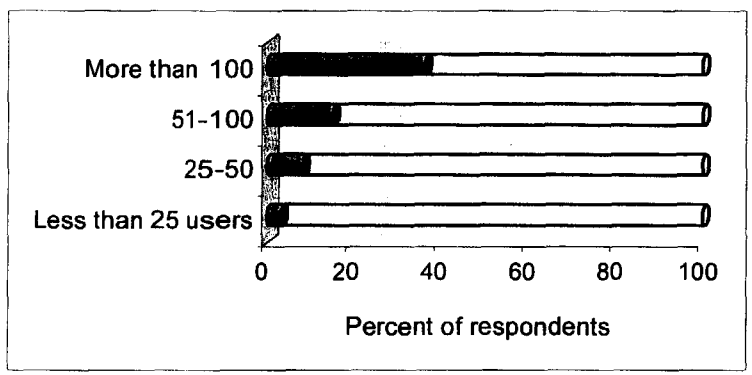
AGENCIES THAT SUPPORT AVL BY NUMBER OF USERS



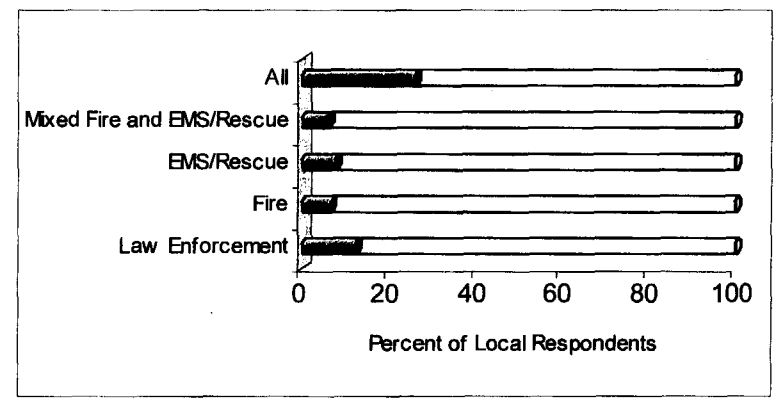
AGENCIES THAT SUPPORT AVL BY MISSION TYPE



AGENCIES THAT SUPPORT CAD BY NUMBER OF USERS



AGENCIES THAT SUPPORT CAD BY MISSION TYPE



LOCAL AGENCY RESPONSES DID NOT PROVIDE SUFFICIENT INFORMATION TO ASSESS THE STATE OF VARIOUS NETWORK EQUIPMENT MARKETS

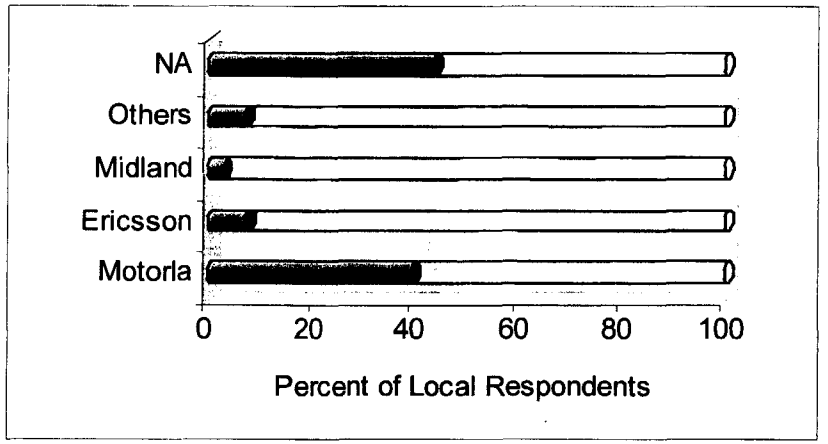
- Fewer local respondents provided information about their repeater and base station vendors than they did about their portable and mobile radio vendors
  - Over 40% of local respondents did not indicate the vendor for their repeaters and base stations
  - Of the local respondents that indicated base station and repeater vendors, Motorola appeared to have the most substantial amount of the market

- Responses to survey questions about console vendors were more incomplete than questions about repeater and base station vendors
  - Nearly 60% of local respondents did not indicate the vendor for their dispatch console
  - Of the local respondents who did indicate a console vendor, Motorola appeared to be agencies' primary vendor
  - Ericsson and Orbacom also supplied dispatch consoles to respondents, but neither appeared to have a significant percentage of the market

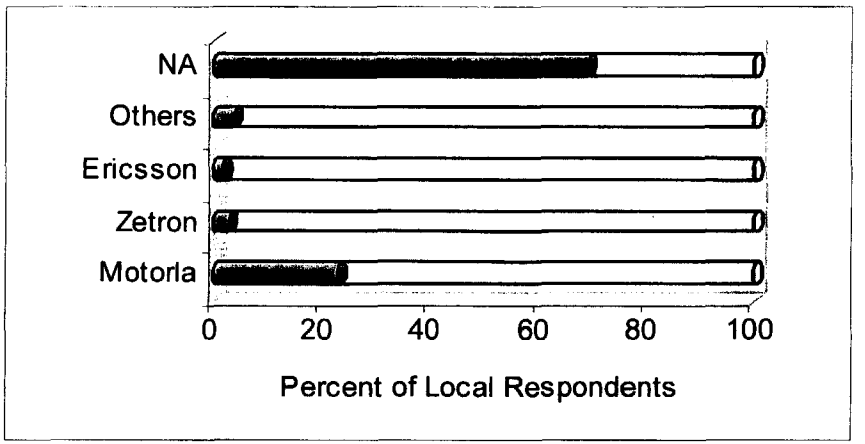
- Similar to questions about portable and mobile radio vendors, the responses to questions about network equipment vendors were optional

DISTRIBUTION OF BASE STATION/REPEATER AND CONSOLE VENDORS (LOCAL RESPONDENTS)

BASE STATION AND REPEATER VENDORS[1]



CONSOLE VENDORS[2]



Note 1: "NA (Not Available)" represents those respondents who did not indicate base station/repeater vendors
"Other" includes Aerotron, Bendix-King, Transcrypt (EF Johnson), Kenwood, Maxon, Regency, Relm, E.F. Harris, Standard, Uniden, UNK, Yaesu, and Zetron

Note 2: "NA (Not Available)" represents those respondents who did not indicate console vendors
Other" includes Aegis, Baker Audio, Centurion Co., CML, CSX, Custom, Midland, Moducom, Seconde, Uniden and Zetron